

S/N 10/ 720,409  
Applicant Feng Chen  
Reply to the Office action (#2) dated 04 Nov 2005

Page 3  
Attorney Docket: CS03-039

### AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application:

#### Listing of claims:

1. (PREVIOUSLY PRESENTED) A CMP retaining ring, comprising:
  - an inner peripheral surface;
  - an outer peripheral surface;
  - a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of a substrate;
  - at least a groove on said lower surface of said retaining ring; and said groove extending from a position at or adjacent said inner peripheral surface of said retaining ring, to a position at or adjacent said outer peripheral surface of said retaining ring;
  - at least a portion of said groove has a rounded contour or slanted contour; said groove is comprised of: sidewalls, a flat bottom, and rounded bottom corners between said sidewalls and said flat bottom.
2. (CANCELED)
3. (CANCELED)
4. (CANCELED)
5. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said groove has curved sidewalls with a curved cross sectional shape, rounded bottom corners and a flat horizontal bottom; the rounded bottom corners are between said flat horizontal bottom and said curved sidewalls.
6. (CANCELED)

S/N 10/ 720,409  
Applicant Feng Chen  
Reply to the Office action (#2) dated 04 Nov 2005

Page 4  
Attorney Docket: CS03-039

7. (ORIGINAL) The CMP retaining ring of claim 1 wherein said groove has rounded top corners adjacent to the lower surface of said retaining ring.

8. (CANCELED)

9. (ORIGINAL) The CMP retaining ring of claim 1 wherein said groove has a width between 1 mm and 30 mm; said groove has a depth between 1 and 15 mm.

10.(PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said groove is comprised of:

rounded top corners near the lower surface of the ring;

said sidewalls are about vertical and flat.

11. (CANCELED)

12.(CURRENTLY AMENDED) The CMP retaining ring of claim 1 wherein said groove has straight sidewalls, top corners, said rounded bottom corners, and an about horizontal bottom; said rounded bottom corners are rounded or curvilinear; said rounded bottom corners are adjacent to said horizontal bottom and said straight sidewalls.

13. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said retaining ring further comprises other channels; the lower surface of the retaining ring further comprises a plurality of protrusions and recesses or a mixture of both.

14. (PREVIOUSLY PRESENTED) A process for chemical-mechanical polishing a substrate comprising:

S/N 10/ 720,409  
Applicant Feng Chen  
Reply to the Office action (#2) dated 04 Nov 2005

Page 5  
Attorney Docket: CS03-039

said substrate is disposed within a polishing head facing a polishing table; said substrate is retained within the polishing head by a retainer ring,

said retaining ring is comprised of:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of the substrate;

at least a groove on said lower surface of said retaining ring; and

said groove is comprised of: sidewalls, a flat bottom, and rounded bottom corners between said sidewalls and said flat bottom;

supplying a slurry to said polishing table or to said polish head;

moving the polishing table and/or the polishing head to chemically polish the wafer.

15. (ORIGINAL) The process of claim 14 which further includes: said substrate is a wafer; forming a deposition layer on the surface of said wafer and chemical mechanically polishing said deposition layer.

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (PREVIOUSLY PRESENTED) The process of claim 14 wherein and said groove extends from a position at or adjacent said inner peripheral surface of said retaining ring, to a position at or adjacent said outer peripheral surface of said retaining ring.

20. (CANCELED)

S/N 10/ 720,409  
Applicant Feng Chen  
Reply to the Office action (#2) dated 04 Nov 2005

Page 6  
Attorney Docket: CS03-039

21. (ORIGINAL) The process of claim 14 wherein said groove has rounded top edges adjacent to the lower surface of said retaining ring.
22. (ORIGINAL) The process of claim 14 wherein said groove has a width between 1 and 30 mm; said groove has a depth between 1 and 15 mm.
23. (PREVIOUSLY PRESENTED) The process of claim 14 wherein said groove has curved sidewalls with a curved cross sectional shape, rounded bottom corners and a flat horizontal bottom; the rounded bottom corners are between said flat horizontal bottom and said curved sidewalls.
24. (PREVIOUSLY PRESENTED) The process of claim 14 wherein  
said sidewalls are about vertical flat sidewalls,  
said flat bottom is an about horizontal flat bottom, and  
said rounded bottom corners are two rounded bottom corners between  
said vertical flat sidewalls and said about horizontal flat bottom.
25. (PREVIOUSLY PRESENTED) The process of claim 14 wherein said groove is  
comprised of:  
rounded top corners near the lower surface of the ring;  
said sidewalls are about vertical flat sidewalls.
26. (PREVIOUSLY PRESENTED) The process of claim 14 wherein  
said sidewalls are flat sloped sidewalls.
27. (PREVIOUSLY PRESENTED) The process of claim 14 wherein said groove is  
comprised of a rounded top corner, flat sloped sidewalls; the flat bottom, two rounded  
bottom corners between said flat sloped sidewalls and the flat bottom;  
the rounded top corners are adjacent the lower surface of the ring.

S/N 10/ 720,409  
Applicant Feng Chen  
Reply to the Office action (#2) dated 04 Nov 2005

Page 7  
Attorney Docket: CS03-039

28. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said sidewalls are flat sloped sidewalls;  
said groove is comprised of two rounded bottom corners between the sidewalls and the flat bottom;  
said groove has a rounded top corner near the lower surface of the ring.

29. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said groove is comprised of rounded top corners, flat sloped sidewalls; a flat horizontal bottom, two rounded bottom corners between said flat sloped sidewalls and the flat horizontal bottom;  
the rounded top corners are adjacent the lower surface of the ring.

30. (PREVIOUSLY PRESENTED) A CMP retaining ring, comprising:  
an inner peripheral surface;  
an outer peripheral surface;  
a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of a substrate;  
at least a groove on said lower surface of said retaining ring;  
said groove is comprised of: sidewalls, a flat bottom, rounded bottom corners between said sidewalls and said flat bottom.

31. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 30 which further comprises: said sidewalls have a curved cross sectional shape, and said flat bottom is horizontal.

32. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 30 which further comprises:  
said sidewalls are flat sloped sidewalls;  
said flat bottom is a flat horizontal bottom.

S/N 10/ 720,409  
Applicant Feng Chen  
Reply to the Office action (#2) dated 04 Nov 2005

Page 8  
Attorney Docket: CS03-039

33. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 30 wherein

said sidewalls are flat sloped sidewalls;

said flat bottom is a flat horizontal bottom;

said groove further comprises rounded top corners near the lower surface of the ring and adjacent to said flat sloped sidewalls.

34. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 30 which further comprises:

said sidewalls are flat vertical sidewalls;

said flat bottom is a flat horizontal bottom.

35. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 30 wherein

said sidewalls are flat vertical sidewalls;

said flat bottom is a flat horizontal bottom;

said groove further comprises rounded top corners near the lower surface of the ring and adjacent to said flat vertical sidewalls.

36. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 30 wherein

and said groove extends from a position at or adjacent said inner peripheral surface of said retaining ring, to a position at or adjacent said outer peripheral surface of said retaining ring.